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Remarks:

Applicant's status:

The undersigned states that in January, 2010, all rights and interest in this application have passed by business acquisition to Outotec Pty. Ltd., the Australian subsidiary of Outotec Pty. Ltd. (Espoo, Finland). Hereafter the applicant is a "large entity" and appropriate USPTO fees reflecting this change of status.

Amendments to the claims:

Claims 1 and 3-14 are pending in this application. By this Amendment, claim 1 is amended to address a rejection under 35 USC 112.

No new matter is added to the application by this Amendment. Support for the features added to claim 1 can be found in FIG. 3, as originally filed, and within the specification, as originally filed, at, for example, paragraphs [0051] and [0052] of US Patent Publication No.: 2007/0175299 for the present application.

Regarding the rejection of claims 1 and 3-14 under 35 USC 112, second paragraph:
Applicants respectfully traverse the rejection of the foregoing claims.

In the Office Action, the Patent Office alleges that claim 1 is indefinite and sets forth:

With respect to the limitation "but so that a jet or stream of the injected gas is unable to pass through the lower surface of the slag phase and the gas is substantially precluded from contacting the continuous copper phase", the examiner notes that "unable to pass through the lower surface of the slag phase" would not allow for contact with the copper phase. However, "substantially precluded from contacting the continuous copper phase" would allow for contact with the copper phase and thus it is unclear whether the scope of the claim includes injected gas that contacts the copper phase or injected gas that does not contact the copper phase.

Applicants respectfully disagree with the allegations of the Patent Office.

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Claim 1 was amended to require that the depth of the iron based silicate slag phase and the level at which the discharge tip of the lance is located in the slag phase are such that the injected oxidizing gas agitates the slag phase and reacts with copper sulfide matte dispersed in the slag phase but so that a jet or stream of the injected oxidizing gas is unable to pass through a lower surface of the slag phase and the oxidizing gas within the jet or stream is precluded from contacting the continuous copper phase.

The presently claimed jet or stream is unable to pass through the lower surface of the slag phase, and the presently claimed oxidizing gas within the jet or stream is precluded from contacting the continuous copper phase. Thus, the presently claimed gas within the jet or stream is different and distinguishable from dispersed oxidizing gas not within the jet or stream or oxidizing gas merely dispersed from the jet or stream.

In contrast, if the jet or stream passes through the lower surface of the slag phase, then the gas within the jet or stream would not be precluded from contacting the copper phase. Instead, there would be contact between virtually all of the gas of the jet and the copper phase which results in a significant level of re-oxidation of the copper.

According to presently claimed process, the jet or stream is not to pass through the lower surface of the slag phase. Thus, there is no contact between the jet or stream of injected oxidizing gas and the copper. Additionally, there is no contact between the oxidizing gas within the jet or stream and the copper. Therefore, while the jet or stream does not pass through the lower surface of the slag, some dispersed gas could be present at the lower surface of the slag and minimally be in surface-to-surface contact with the copper.

In view of the amendments to claim 1, Applicants submit that amended claim 1 is definite and particularly points out and distinctly claims the subject matter which Applicants regard as the invention.

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Applicants respectfully request withdrawal of this rejection of claim 1 and 3-14.

Regarding the rejection of claims 1, 3-7, 13 and 14 under 35 USC 103(a) in view of US 5888270 to Edwards (hereinafter simply "Edwards") and US 3281236 to Meissner (hereinafter simply "Meissner"):

Applicants respectfully traverse the rejection of the indicated claims in view of the combined Edwards and Meissner references.

The Patent Office acknowledges that Edwards fails to teach that the gas is substantially precluded from contacting the continuous copper phase. The Patent Office alleges (i) that, in view of the indefiniteness of claim 1, Edwards teaches that a "substantial portion of the gas contacts the blister copper from the continuous slag phase, and (ii) the instantly claimed term "substantially" is ambiguous and is interpreted by the Examiner to overlap the disclosure provided by Edwards (see page 4 of the Office Action). Moreover, the Patent Office (iii) acknowledges that Edwards fails to teach the slag phase having a depth of from about 700 mm to about 1.7 m, (iv) alleges because the processes and treated compositions are similar, in absence of proof to the contrary, it would be expected that the compositions taught by Edwards in view of Meissner would have similar slag phase having a depth of from about 700 mm to about 1.7 m as claimed (see pages 4 and 5 of the Office Action). Applicants respectfully disagree with the allegations by the Patent Office.

With regard to the rejection of claims 1 and 5-7, the Patent Office's grounds of rejection are believed to be improper, as it appears that the Patent Office's interpretation of the Edwards reference is that it discloses an iron-based silicate slag. This interpretation is erroneous because Edwards only teaches a chemically distinct calcium ferrite slag.

It is evidenced that the Patent Office's allegation is erroneous and that Edwards fails to teach an iron-based silicate slag because (1) the Patent Office subsequently admits that Edwards does not teach iron-based silicate slag or ferrous calcium silicate olivine slag,

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and (2) introduces Poijarvi as allegedly remedy that deficiency by using fayalite which is an iron-based silicate and is a type of olivine mineral (see page 5, Section 9a of the present Office Action). Further evidence that the Patent Office's allegation is erroneous is set forth in Paragraph 5(a) of the *Dr. Markus A. Reuter's March 7, 2009 Declaration* (hereinafter "the *Declaration*") which lists all references to slag in Edwards, while paragraph 5(b) of the *Declaration* states that distinctly different slag systems (in terms of chemistry and characteristics) are used in Edwards and the invention of the presently rejected claims, particularly the invention defined in claim 1. Dr. Reuter is an acknowledged authority in the technical field to which the current invention relates as set forth in the *Declaration* and in the July 6, 2009 Amendment.

Claim 1 requires injection of the oxidizing gas into the slag (and, hence, above the copper which is below the slag) by the presently claimed positioning of the discharge tip of the lance which is not disclosed by Edwards. Thus, as set forth above, while the presently claimed discharge tip of the lance does not pass through the lower surface of the slag, some gas dispersed from the jet could be present at the lower surface of the slag and therefore minimally be in surface-to-surface contact with the copper.

It is the Applicants' position that Edwards does not teach or suggest positioning the discharge tip of the lance so that the jet or stream of oxidizing gas is unable to pass through the lower surface of the slag phase and the oxidizing gas within the jet or stream is precluded from contacting the copper phase. In contrast and throughout Edwards, it is emphasized that a substantial portion of the injected gas contacts the blister copper phase, which is below the slag phase (see Example 4 and col. 2, lines 7, 8, 40 and 41). It is essential to Edwards that "a substantial portion of the gas contacts the continuous blister copper phase" as evidenced by claims 1, 2 and 5 of Edwards. In other words, Edwards sets forth that even the lower end of the lance can pass through the lower surface of the slag, with the gas within it's jet therefore injected within the copper and substantially all of the gas within it's jet making very substantial, largely complete contact with the copper phase below the slag.

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Thus, the teaching of Edwards is almost diametrically opposed to such contact being precluded as required in the present claims. Moreover, throughout Edwards, it is stressed that the gas injection is to be deep within the slag to achieve such contact of the copper phase by the injected gas (see col. 3, lines 16-30).

As made clear by paragraph 6 of the *Declaration*, the presently claimed positioning of the discharge tip is to avoid the very condition Edwards stresses as being necessary. That is, Edwards requires the gas to contact the copper, whereas claim 1 requires that this contact be avoided.

Meissner fails to remedy the deficiencies of Edwards because Meissner also teaching injection of gas into the copper phase. Specifically, Meissner teaches that all of the injected gas contacts the copper phase, and none of the injected gas is precluded from such contact with the copper phase. Thus, Meissner's teachings are similar to Edwards and completely contrary to present claim 1.

Moreover, Meissner does not disclose a lance having its lower end injecting into a slag phase and, indeed, the slag phase is simply a by-product of the process of Meissner and can be removed as it forms. Meissner does not disclose an adjustable lance, but only fixed tuyers (which, unlike a lance, do not project into or "lance" any atmosphere or material). More importantly, Meissner teaches the need for injected gas to contact the copper phase, which is in line with Edwards but contrary to claim 1, while Meissner does not inject into a necessarily present slag phase, again contrary to claim 1. These foregoing issues are further evidenced by paragraphs 7 and 8 of the *Declaration*.

Thus, Applicants submit that the Patent Office errors by relying on Meissner to show that it is purportedly obvious to modify Edwards to avoid achieving the gas contact with the copper which is essential to Edwards' teaching.

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With respect now to the Patent Office's rejection of claims 3 and 4, Applicants traverse the Patent Office's allegations that consideration of Edwards would teach the process of claim 1. This is simply incorrect. The Patent Office's attention is directed to paragraphs 5 to 9(a) of the *Declaration* for the rational why the Patent Office's position is incorrect. Further, the combination of Edwards and Meissner does not teach a slag phase having a depth of from about 700 mm to about 1.7 m (as recited in claim 4). Similarly, the combination of Edwards and Meissner does not teach the slag phase depth of from about 500 mm to about 2 m as required by claim 3.

The Patent Office also asserts that the compositions taught by Edwards in view of Meissner would have a similar slag phase with a depth of from about 700 mm to about 1.7 m. Even if this assertion is correct, it does not remedy the deficiencies of Edwards with respect to claim 1. Moreover, even if Edwards is modified by the teachings of Meissner, the resulting combination fails to achieve the presently claimed process for the reasons set forth in paragraphs 5 to 9(a) of the *Declaration*.

Even if Edwards had used a slag depth as in claims 3 or 4, it would simply mean that the lance would have to extend through that slag depth to position the tip (at the lower end of the lance) close to or within the copper phase so that injected gas contacted the copper phase. In contrast, in the presently claimed invention, the lance would extend a lesser distance into the slag so that the gas was injected into the slag but did not contact the copper phase below the slag. A substantial depth of slag facilitates injection within the slag without injected gas contacting the copper phase. Such a depth in Edwards serves no purpose as Edwards teaches a need for the gas to contact the copper phase. Meissner does not inject gas into the slag at all; instead, Meissner teaches injection into the copper phase. Thus, contrary to the Patent Office's allegations, nowhere in Meissner is there a teaching of injection into slag at all or of providing a deep slag phase. This issue is addressed more fully in and evidenced by paragraph 9(b) of the *Declaration*.

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With respect to the rejection of claims 13 and 14, Applicants traverse the rejection. Edwards does not teach or suggest the addition of coal to a slag of the type required by the presently claimed process. A skilled artisan would not appreciate that those slags could be used in the process of Edwards, but rather the expectation would be that the slags would foam due to precipitation of magnetite. There is no disclosure in Edwards that the addition of coal would retard precipitation of magnetite and prevent foaming such that the slags of the presently claimed invention could be used. Furthermore, Applicants' position is supported by paragraph 10 of the *Declaration* which is responsive to the Patent Office's rejection.

In view of the foregoing remarks, as well as in view of the remarks presented in the *Declaration*, reconsideration of and withdrawal of the outstanding grounds of rejection of the indicated claims are solicited.

Regarding the rejection of claims 8 – 12, under 35 USC 103(a) in view of US 5888270 to Edwards et al. (hereinafter simply "Edwards") and further in view of WO 01/49890 to Poijarvi (hereinafter simply "Poijarvi"):

Applicants respectfully traverse the rejection of the indicated claims in view of the combined Edwards and Poijarvi references.

With respect to the Examiner's rejection of claims 8-10, Applicants submit that Poijarvi is not relevant to the teachings of Edwards or the presently claimed invention because Poijarvi produces matte and not a copper phase as produced in Edward or required by the present claims.

Poijarvi sets forth "[I]f both matte and blister production take place in the same smelter so that slag processing can be handled jointly, it is advantageous that both reactors use the same type of slag" (see page 3, lines 22-25). The Patent Office has incorrectly interpreted this passage to mean "it is advantageous to use an iron silicate slag if both

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matte and blister production take place in the same smelter, as is the case in the case in Edwards as set forth in the first paragraph on page 6 of the present Office Action.

Instead, Poijarvi discloses that if both the matte and blister are being produced in respective reactors at the same smelting facility, processing of the respective slag from each reactor can be handled jointly, with there being a self evident advantage in having the same type of slag (whether it is iron based or otherwise) produced in each reactor. Figure 2 of Poijarvi shows the type of smelting facility that a smelter might operate to enable the slag processing to be handled jointly. The primary smelting furnace smelts concentrate to produce matte and a first slag. The matte and concentrate are fed to the FSF to produce blister and a second slag, and the first and second slags are handled jointly in that they each pass by different routs to the slag concentrating plant. For this, it is desirable that the first and second slags are of the same types. However, recognition of this in Poijarvi is not limited by the previous sentence on the different slags able to be used in the FSF.

In the process according to Poijarvi, the involvement of slag is fundamentally different to the presently claimed process and Edwards. In Poijarvi, the slag is produced in the course of producing blister copper or of producing matte. The type of slag depends on the choice of flux. The concentrate, matte and flux solids are mixed and blown in a stream of preheated oxygen containing gas down in the FSF, so as to react and produce blister copper and slag which collects in separate layers at the base of the reactor. In contrast, both Edwards and the presently claimed process disperse matte in a bath of molten slag.

Edwards teaches the use of a calcium ferrite slag because it is known there is a high risk of a iron silicate slag foaming. As a result, a serious problem may interrupt proper functioning of smelting to produce blister copper. However, Applicants have found that the risk of foaming can be reduced by inter alia use of lump coal. The slag foaming results from the precipitation of magnetite which has limited solubility in iron based

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silicate slags, whereas foaming is not a problem in Edwards due to the high solubility of magnetite in calcium ferrite slags. Poijarvi is not relevant as the type of reactor used in Poijarvi does not give rise to a risk of foaming with iron based silicate slags, and Poijarvi provides no guidance for addressing foaming in other contexts in which foaming is a serious problem.

The crucial issue is that the slags of the presently claimed invention and Edwards each may contain CaO, FeO, SiO₂, these slags behave quite differently. The iron based silicate slags of the present invention differ from calcium ferrite slags of Edwards as shown in the following table:

Property	Iron based Silicate	Calcium Ferrite
Viscosity	Medium to high	Low
Copper entrainment	Medium to high	Low
Magnetite precipitation	Medium to high	Low
Tendency to foam	Medium to high	Low
Refractory wear	Medium	High

In relation to the above-identified table, a number of factors indicate that the calcium ferrite slag is acceptable, and that the iron based silicate slags, while acceptable in other contexts, should not be used in the context of the presently claimed invention and Edwards. The fact that the two classes of slag are distinct is made clearest by the low solubility of magnetite in the iron based slag of the present invention, leading to the serious issue of slag foaming, whereas magnetite is absorbed by the calcium ferrite slags. Also, as indicated, the present invention is based on finding that the expected adverse features of iron based silicates can be accommodated or overcome, by floating lump coal on the surface of the slag to reduce or prevent the formation of magnetite. While Edwards adds reductant, this is for an unrelated purpose as magnetite is able to be absorbed by the calcium ferrite slag. Also, the presently claimed invention avoids

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injecting into the copper phase, in contrast to Edwards, achieving a more homogeneous slag phase and thereby further reducing the risk of foaming.

Applicants traverse the rejection and direct the Examiner's attention to the remarks forming paragraph 12 of the *Declaration* which are also responsive to the Examiner's rejection.

With regard to the Examiner's rejection of claims 11 and 12, Applicants traverse the rejection and direct the Examiner's attention to the remarks presented in paragraphs 13 and 14 of the *Declaration* which are responsive to the Examiner's rejection

Accordingly, reconsideration of and withdrawal of the outstanding grounds of rejection of the indicated claims are solicited.

Should the Examiner in charge of this application believe that telephonic communication with the undersigned would meaningfully advance the prosecution of this application, they are invited to call the undersigned at their earliest convenience.

The early issuance of a *Notice of Allowability* is solicited.

PETITION FOR A THREE-MONTH EXTENSION OF TIME

Applicants respectfully petition for a three-month extension of time in order to permit for the timely entry of this response. The Commissioner is hereby authorized to charge the fee to Deposit Account No. 14-1263 with respect to this petition.

CONDITIONAL AUTHORIZATION FOR FEES

Should any further fee be required by the Commissioner in order to permit the timely entry of this paper, including any extension of time fees, the Commissioner is authorized to charge any such fee to Deposit Account No. 14-1263.

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Respectfully Submitted;

Andrew N. Parfomak
Andrew N. Parfomak, Esq.
Reg.No. 32,431
Norris, McLaughlin & Marcus, PC
875 Third Avenue, 18th Floor
New York, NY 10022

12. Feb. 2010
Date:

Tel: 212 808-0700

CERTIFICATION OF TELEFAX TRANSMISSION:

I hereby certify that this paper and all attachments thereto is being telefax transmitted to the US Patent and Trademark Office to telefax number: 571 273-8300 on the date shown below:

Allyson Ross
Allyson Ross

12. Feb. 2010
Date:

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